ENVIRONMENTAL PROTECTION AGENCY

[EPA-HQ-OW-2022-0365 and EPA-HQ-OW-2022-0366; FRL 8310-02-OW]

Final Recommended Aquatic Life Criteria and Benchmarks for Select PFAS

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability.

SUMMARY:

As part of the Environmental Protection Agency's (EPA) commitment to safeguard the environment from per- and polyfluoroalkyl substances (PFAS), the agency is announcing the availability of national "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Aquatic Life Benchmarks for Perfluorooctanoic Acid (PFOA)" and "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Acute Saltwater Aquatic Life Benchmarks for Perfluorooctane Sulfonate (PFOS)," pursuant to the Clean Water Act (CWA). The EPA is also announcing the availability of Acute Freshwater Aquatic Life Benchmarks for eight data-limited perfluoroalkyl substances (PFAS): perfluorobutanoic acid (PFBA), perfluorohexanoic acid (PFHxA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), 2H-perfluoro-2-decenoic acid (8:2 FTUCA), and 2H,2H,3H,3H-

pefluorodecanoic acid (7:3 FTCA). These final CWA recommended criteria and benchmarks provide information that States and Tribes may consider when adopting water quality standards. Consistent with Clean Water Act sections 304(a)(1) and (a)(2), the EPA expects to update these recommended criteria and benchmark values from time to time as new information becomes available. This announcement is in accordance with Clean Water Act section 304(a)(3), which directs the EPA to publish information developed under sections 304(a)(1) and (a)(2) in the *Federal Register* and make it available to States, Tribes, and the public.

FOR FURTHER INFORMATION CONTACT: James Justice, Health and Ecological Criteria Division, Office of Water, Environmental Protection Agency; email address: *justice.jamesr@epa.gov*.

SUPPLEMENTARY INFORMATION:

I. How Can I Get Copies of These Documents and Other Related Information?

The EPA has established a first docket for the "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Saltwater Acute Benchmarks for Perfluorooctanoic Acid (PFOA)" under Docket ID No. EPA-HQ-OW-2022-0365 and a second docket for the "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Saltwater Acute Benchmarks for Perfluorooctane Sulfonate (PFOS)" under Docket ID No. EPA-HQ-OW-2022-0366. Publicly available docket materials are available either electronically through *www.regulations.gov* or in hard copy at the EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The Docket Center's hours of operations are 8:30 a.m. – 4:30 p.m.,

Monday through Friday (except Federal Holidays). For further information on the EPA Docket Center services and the current status, see*: https://www.epa.gov/dockets*.

The "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Saltwater Acute Benchmarks for Perfluorooctanoic Acid (PFOA)" document can be accessed on the EPA's website through the following link: *https://www.epa.gov/system/files/documents/2024-09/pfoa-report-2024.pdf*. The "Final Recommended Freshwater Aquatic Life Ambient Water Quality Criteria and Saltwater Acute Benchmarks for Perfluorooctane Sulfonate (PFOS)" document can be accessed on the EPA's website through the following link: *https://www.epa.gov/system/files/documents/2024-09/pfos-report-2024.pdf*. The "Final Acute Freshwater Aquatic Life Benchmarks for Eight Data-Limited PFAS: PFBA, PFHxA, PFNA, PFDA, PFBS, PFHxS, 8:2 FTUCA, and 7:3 FTCA" document can be accessed on the EPA's website through the following link: *https://www.epa.gov/system/files/documents/2024-09/pfas-report-2024.pdf*.

II. What are PFAS, including PFOA and PFOS?

Per- and polyfluoroalkyl substances (PFAS) are human-made organic chemical compounds composed of a carbon chain bound to multiple fluorine atoms. PFAS have been manufactured and used by a broad range of industries since the 1940s, and there are estimated to be thousands of PFAS present in the global marketplace that are used in a range of commercial and industrial products. PFOA and PFOS are two of the most widely used and studied chemicals in the PFAS group. PFAS are not naturally occurring and have no biologically important functions or beneficial properties to aquatic life.

PFAS, including PFOA and PFOS, can persist in the environment and have been detected in U.S. rivers, lakes, and streams. At elevated concentrations, PFAS can be toxic to fish and other aquatic species.

III. What are CWA National Ambient Water Quality Criteria and Benchmarks Developed by the EPA?

CWA section 304(a) directs the EPA to develop and publish water quality criteria that reflect the latest scientific knowledge. The EPA develops national recommended ambient water quality criteria for the protection of aquatic life based on the highest numeric concentrations of pollutants, with specific recommendations on the duration and frequency of those concentrations, that are protective of aquatic ecosystems as a whole. The EPA's section 304(a)(1) criteria recommendations generally follow the *Guidelines* methods (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*), which recommend toxicity data for a minimum of eight families of aquatic animals be used in developing aquatic life criteria to ensure criteria will protect aquatic ecosystems as a whole. Water quality criteria are based solely on data and scientific judgments about the relationship between pollutant concentrations and potential environmental effects. The EPA's recommended water quality criteria are not regulatory, nor do they automatically become part of a State's water quality standards. States must adopt into their standards water quality criteria that protect the designated uses of their water bodies. States can establish water quality criteria based on the EPA's recommended criteria, modify recommended criteria to reflect site-specific conditions, or develop proposed standards using on other

scientifically defensible methods. A State's or Tribe's water quality criteria are not legally effective under the Clean Water Act until they have been adopted into a State's or Tribe's water quality standards and are approved by the EPA.

Aquatic life benchmarks, developed under section 304(a)(2) of the CWA, are informational values that the EPA generates when there are limited high quality toxicity data available and data gaps exist for several aquatic organism families. The EPA develops aquatic life benchmarks to provide information that States and Tribes may consider in their water quality protection programs. In developing aquatic life benchmarks, data gaps may be filled using new approach methods (NAMs), such as computer-based toxicity estimation tools (e.g., EPA's Web-ICE; Version 3.3; *https://www.epa.gov/webice/*) or other new approach methods intended to reduce reliance on additional animal testing (*https://www.epa.gov/chemical-research/epa-new-approach-methods-work-plan-reducing-use-vertebrate-animals-chemical*), including the use of read-across estimates based on other chemicals with similar structures. The EPA's aquatic life benchmark values are not regulatory, nor do they automatically become part of a State's water quality standards.

IV. What are the EPA's Recommended Criteria for PFOA and PFOS in Freshwater for the Protection of Aquatic Life?

The EPA has developed separate PFOA and PFOS criteria to protect aquatic life from the effects of these individual chemicals. The EPA developed these final recommended aquatic life ambient water quality criteria following the general approach

outlined in the EPA's *Guidelines.*[1] The EPA developed the final PFOA and PFOS recommended criteria to protect aquatic life designated uses established for freshwaters. The final criteria documents contain acute and chronic water column criteria for freshwaters (see Table 1 of this document). Acute criteria protect aquatic species from short-term exposures to high pollutant concentrations while chronic criteria protect aquatic species from long-term and repeated pollutant exposures. The final criteria also contain chronic criteria expressed as PFOA and PFOS concentrations in fish muscle tissue, fish whole-body tissue, and in invertebrate tissue (see Table 1 of this document). Many States and Tribes measure PFAS in fish tissues and these tissue-based criteria values allow States and Tribes to assess the health of fish and invertebrates in their freshwaters. The chronic freshwater and chronic fish/invertebrate tissue-based criteria for both chemicals are intended to be independently applicable and no one criterion takes primacy.

The PFOA and PFOS criteria establish maximum concentrations (i.e., magnitude component), averaged over a given time period (i.e., duration component), that if not exceeded more than the allowable number of times during a specified time period (i.e., frequency component), are expected to protect aquatic ecosystems as a whole. The duration components of criteria are set to be substantially shorter than the length of toxicity tests used to derive the criteria magnitude and restrict allowable fluctuations in pollutant concentrations over time. The frequency components of aquatic life criteria

[1] The EPA's *Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* can be accessed through the EPA webpage at: *https://www.epa.gov/sites/default/files/2016-02/documents/guidelines-water-quality-criteria.pdf.*

ensure aquatic communities have adequate time to recover following a criteria exceedance event. The EPA's final recommended PFOA and PFOS criteria magnitudes combined with the associated duration and frequency components are expected to protect fish and other aquatic species in freshwaters (see Table 1).

Table 1. Final Recommended Freshwater Aquatic Life Water Quality Criteria for PFOA and PFOS

Criteria Component	Acute Water Column (CMC)[1]	Chronic Water Column (CCC)[2]	Invertebrate Whole-Body	Fish Whole-Body	Fish Muscle
PFOA Magnitude	3.1 mg/L	0.10 mg/L	1.18 mg/kg ww[4]	6.49 mg/kg ww[4]	0.133 mg/kg ww[4]
PFOS Magnitude	0.071 mg/L	0.00025 mg/L	0.028 mg/kg ww[4]	0.201 mg/kg ww[4]	0.087 mg/kg ww[4]
Duration	1-hour average	4-day average	Instantaneous[3]		
Frequency	Not to be exceeded more than once in three years, on average	Not to be exceeded more than once in three years, on average	Not to be exceeded[5]		

[1] Criterion Maximum Concentration.
[2] Criterion Continuous Concentration.
[3] Tissue data provide instantaneous point measurements that reflect integrative accumulation of PFOA or PFOS over time and space in aquatic life population(s) at a given site.
[4] Wet-Weight.
[5] PFOA and PFOS chronic freshwater tissue-based criteria should not be exceeded, based on measured tissue concentrations representing the central tendency of samples collected at a given site and time.

V. What are the EPA's Saltwater Acute Benchmarks for Protecting Aquatic Life from PFOA and PFOS?

Data limitations did not allow for derivation of PFOA or PFOS national recommended water quality criteria to protect saltwater organisms. Therefore, the EPA derived PFOA and PFOS aquatic life benchmark values under section 304(a)(2) of the

CWA using the best available data on the effects of PFOA and PFOS to provide information that States and Tribes may consider in their water quality protection programs. These benchmark values are based solely on data and scientific judgments about the relationship between pollutant concentrations and potential environmental effects. Like national recommended water quality criteria, the EPA's acute PFOA and PFOS aquatic life benchmark values for saltwater are nonbinding and nonregulatory.

The EPA derived acute saltwater benchmarks using available toxicity data on PFOA and PFOS, supplemented with data estimated using the EPA's Web-ICE tool. With data gaps addressed using both laboratory and estimated toxicity test data, the acute saltwater benchmarks for PFOA and PFOS were calculated following methods outline in the EPA's *Guidelines.*[1] The EPA's acute saltwater benchmarks for PFOA and PFOS values are the maximum concentrations of these PFOA and PFOS (individually, not in mixture), with associated frequency and duration specifications, that are expected to support protection of aquatic life from acute effects in saltwater (see Table 2).

Table 2. Acute Saltwater Aquatic Life Benchmarks for PFOA and PFOS

Chemical	PFOA	PFOS
Magnitude	7.0 mg/L	0.55 mg/L
Duration	One hour average	
Frequency	Not to be exceeded more than once in three years on average	

VI. What are the EPA's Freshwater Acute Benchmarks for Protecting Aquatic Life from Eight Additional PFAS?

Toxicity data to support benchmarks for these eight PFAS benchmarks were limited relative to the data requirements traditionally used to develop aquatic life criteria.

Therefore, the EPA derived PFAS aquatic life benchmark values under section 304(a)(2) of the CWA using the best available data on the effects of these PFAS to provide information that States and Tribes may consider in their water quality protection programs. These benchmark values are based solely on data and scientific judgments about the relationship between pollutant concentrations and potential environmental effects. Like national recommended water quality criteria, the EPA's eight separate acute aquatic life benchmark values for eight different data-limited PFAS in freshwater are nonbinding and nonregulatory.

Compared to PFOA and PFOS, acute freshwater data were more limited for these eight PFAS that the EPA evaluated. The EPA developed the benchmarks by using the available laboratory-based data on the effects of those chemicals on freshwater organisms, supplemented with data estimated using the EPA's Web-ICE tool, following the same peer-reviewed approach applied in development of the acute saltwater benchmarks for PFOA and PFOS. With data gaps addressed using both laboratory and estimated toxicity test data, the acute benchmarks for these eight PFAS were calculated following methods outline in the EPA's *Guidelines.*[1]

The EPA's acute freshwater benchmark values are the maximum concentrations of these PFAS (individually, not in mixture), with associated frequency and duration specifications, that are expected to support protection of aquatic life from acute effects in freshwaters (see Table 2 of this document). These acute benchmarks for these eight PFAS (Table 3) provide information for States and Tribes to consider as protective values in their water quality protection programs.

Table 3. Acute Freshwater Aquatic Life Benchmarks for Eight PFAS.

Chemical	PFBA	PFHxA	PFNA	PFDA	PFBS	PFHxS	8:2 FTUCA	7:3 FTCA
Magnitude[1]	5.3	4.8	0.65	0.50	5.0	0.21	0.037	0.012
Duration	One hour average							
Frequency	Not to be exceeded more than once in three years on average							

[1] Values expressed as mg/L, or ppm

Bruno Pigott,
Principal Deputy Assistant Administrator.